DRAFT
ENGINEERING EVALUATION FOR GAS TURBINES
SAN MATEO COUNTY YOUTH SERVICES CENTER; PLANT 16930
APPLICATION 13417

BACKGROUND

San Mateo County Youth Services Center has applied for a permit for sixteen (16) natural-gas-fired Capstone 60 turbines as part of a cogeneration system at its new facility plus an emergency diesel engine powered generator. The diesel engine is evaluated separately. These small gas turbines are sold in various cogeneration packages by the vendor. San Mateo County has opted to buy 4 each Model 240 PureComfort Solution systems with each system including four (4) natural-gas-fired Capstone 60 turbines. I have made each Model 240 PureComfort Solution system a source so there are four sources numbered one through four. The Capstone 60 turbine generator set was pre-certified in Application 2778 (copy of evaluation attached). This pre-certification may not be currently valid, but the emission calculation methodology is still valid.

EMISSIONS

Per the attached pre-certification, which is the engineering evaluation for Application Number 2778, the maximum expected daily NOx and CO emissions from each Capstone 60 turbine are 0.74 pounds per day and 0.45 pounds per day, respectively. Expected emissions from a Model 240 PureComfort Solution system are four times the above, or 2.96 pounds per day and 1.8 pounds per day of NOx and CO, respectively. Annual emissions are calculated below:

Since BACT is not triggered until emissions are 10 pounds or more per day per source, NOx and CO are both relaxed from the expected emission level in AN 2778 to 8.88 pounds per day and 5.4 pounds per day of NOx and CO, respectively. Note that this is an allowable increase by a factor of 3. (The District would have approved a permit for a higher emitting source, so this increase essentially gives the owner/operator more margin of compliance.)

Emissions per source consisting of a Model 240 PureComfort Solution system:

NOx = 0.74 lb/day/Capstone 60 turbine * 4 turbines * 3
= 8.88 lb/day
For continuous operation, 8760 hr/yr:
NOx = 8.88 lb/day * 365 days/yr
= 3241 lb/yr = 1.621 tpy

CO = 0.45 lb/day/Capstone 60 turbine * 4 turbines * 3
= 5.4 lb/day
For continuous operation, 8760 hr/yr:
CO = 5.4 lb/day * 365 days/yr
= 1971 lb/yr = 0.986 tpy

According to the calculations in AN2778, 9 PPM NOx @ 15% Oxygen and 9 PPM CO @ 15% Oxygen at max fire results in a daily emission of 0.74 pounds of NOx and 0.45 pounds of CO, respectively.

Allowing three times the mass flow is the same as allowing three times the concentration; so multiplying by three yields the allowed concentration:

Allowed NOx conc. = (9 ppmvd NOx @ 15% Oxygen) * 3
= 27 ppmvd @ 15% oxygen

Allowed CO conc. = (9 ppmvd CO @ 15% Oxygen) * 3
= 27 ppmvd @ 15% oxygen

POC, SO2 and PM10 emissions are shown below and were calculated on the attached spreadsheet using standard AP-42 emission factors for natural gas fired gas turbines:

SO2 = 0.465 tpy
POC = 0.030 tpy
PM10 = 0.093 tpy

Annual emissions for four (4) Model 240 PureComfort Solution systems:

NOx = 1.621 tpy * 4 = 6.484 tpy
CO = 0.986 tpy * 4 = 3.944 tpy
SO2 = 0.465 tpy * 4 = 1.859 tpy
POC = 0.030 tpy * 4 = 0.118 tpy
PM10 = 0.093 tpy * 4 = 0.372 tpy

HEALTH RISK SCREENING ANALYSIS

Emissions of toxic air contaminants were calculated for this application using the mean CATEF II emission factors EXCEPT emission factors from AP-42 were used for benzene and formaldehyde. AP-42 emission factors were used for benzene and formaldehyde since AP-42 had assigned these factors its highest quality rating of A. All TACs are emitted below their respective screening trigger level in Table 2-5-1, so no further analysis was required as allowed by Section 2-5-110.

STATEMENT OF COMPLIANCE

Each gas turbine is exempt from Rule 9-9 by Section 9-9-110, since the power output rating is less than 0.3 megawatts.

This application is considered to be ministerial under the District's CEQA guidelines (Regulation 2-1-311) and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.

The project is co-located with a school and is therefore subject to the public notification requirements of Regulation 2-1-412. Part of the San Mateo Youth Service Center includes a school building within 1,000 feet of this source. A public notice for

schools was distributed for this project. Comments were received and are addressed below:

To be determined

A toxic risk screening is not required for the gas turbines because all potentially toxic compounds are emitted at levels below their screening trigger level.

PSD, NSPS and NESHAPS are not triggered.

BACT

BACT is not triggered because emissions of each regulated pollutant are estimated to be less than 10 lb/highest day.

OFFSETS

Offsets are not required because facility-wide POC and NO_X emissions are less than 10 ton/yr.

PERMIT CONDITIONS

SAN MATEO COUNTY YOUTH SERVICES CENTER
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Sources 1 through 4, Model 240 PureComfort Solution systems with each system including four (4) natural-gas-fired Capstone 60 turbines

CONDITIONS FOR Sources 1 through 4:

1. The owner/operator shall fuel Sources 1 through 4 only with natural gas and/or propane fuel. [Basis: Cumulative Increase]

2. The owner/operator shall not cause an emission from Sources 1 through 4 that exceeds either of the following emissions:

   NOx 8.64 pounds per day (approximately 27 ppmvd at 15% oxygen)
   CO 5.4 pounds per day (approximately 27 ppmvd at 15% oxygen)
   [Basis: Cumulative Increase]

3. To demonstrate compliance with Part 2 above, the owner/operator shall measure the NOx and CO concentration for each source (collectively and/or for each of the four Capstone 60 gas turbines in a source) according to the following schedule:

   a. within 30 days of startup;
   b. at least once per consecutive 12-month period, following startup.

   Measurements may be made using a District-approved source test, or using hand-held portable NOx and CO monitors. Hand-held monitors shall be operated, maintained and calibrated in

accordance with manufacturer guidelines. (Basis: cumulative increase)

4. The owner/operator shall keep the following records for each source, for a period of at least 2 years following the date on which the record was made, and shall make these records available to the District upon request.
   a. NOx and CO concentration measurements taken per Part 3.
   b. Any source tests.
   (Basis: cumulative increase, BACT)

RECOMMENDATION

Issue an Authority to Construct to San Mateo County Youth Services Center for:

S1 Model 240 PureComfort Solution system including four (4) natural-gas-fired Capstone 60 turbines; 60 kW maximum output each turbine; 0.871 MM BTU/hr maximum heat input each turbine; natural gas and/or propane fuel

S2 Model 240 PureComfort Solution system including four (4) natural-gas-fired Capstone 60 turbines; 60 kW maximum output each turbine; 0.871 MM BTU/hr maximum heat input each turbine; natural gas and/or propane fuel

S3 Model 240 PureComfort Solution system including four (4) natural-gas-fired Capstone 60 turbines; 60 kW maximum output each turbine; 0.871 MM BTU/hr maximum heat input each turbine; natural gas and/or propane fuel

S4 Model 240 PureComfort Solution system including four (4) natural-gas-fired Capstone 60 turbines; 60 kW maximum output each turbine; 0.871 MM BTU/hr maximum heat input each turbine; natural gas and/or propane fuel

By: _____

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